Missouri
Department of
Natural Resources

Simple Map Viewer Documentation

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ABOUT

This application is an interactive map viewer. It will allow you to view geographic data provided by the Missouri Department of Natural Resources (MoDNR) in the form of an interactive map in your web browser.

The application was designed to be simple. There are a few tools available to the user to interact with the map and to extract information from the data contained in the maps. These tools are explained in depth later in the documentation. The viewer is based around themes. Each theme contains a fixed set of map layers. Users cannot add or remove layers from the map. However, users can toggle the visibility of layers.

The application home page contains a list of themes available to the user. Once a theme is chosen, the user will be shown a map page. This map can be viewed and queried. Users can query information about features in the central theme. Some themes contain hyperlinks to additional data on the Internet. Users will be notified when they are leaving the map viewer by an 'EXIT' sign like the following icon. **EXIT**

Users can change themes at any time by clicking on the 'Application Home' link in the map window.

GENERAL OPERATION

On the application home page, the user will be presented with a list of themes to view. Each theme will have a brief description, a 'Map' link and a 'Project Home' link. The 'Map' link will take the user to the map page to begin interacting with the geographic features of the map. The 'Project Home' link will take the user outside the application to a Web page that contains more information about the theme.

The map page resembles Figure 1 below. A banner appears at the top of the page, with three links:

- Application Home (Index Page)
- Comments – A page that allows the user to submit comments.
- Help – Help Pages
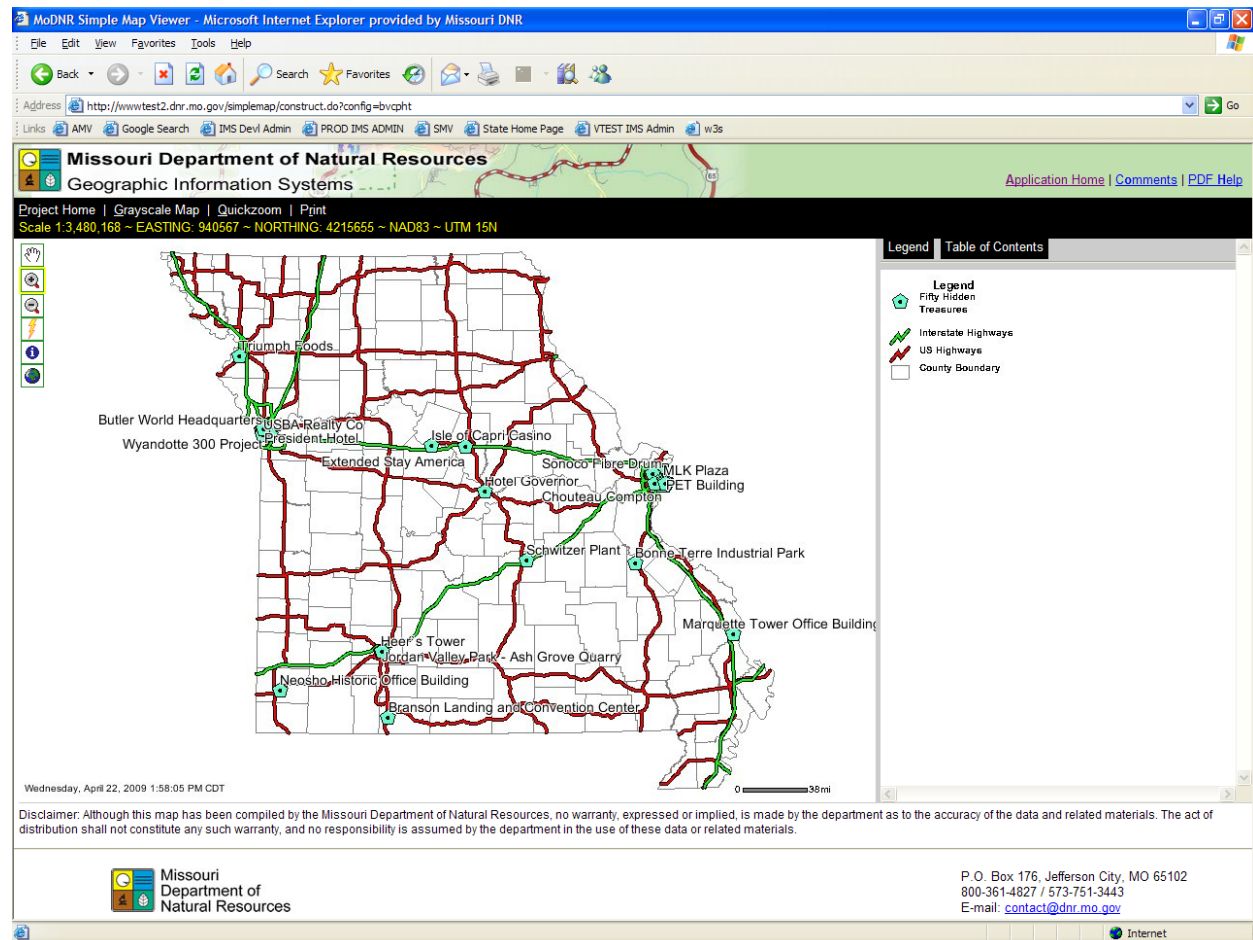
Figure 1 - Map Page

Below the banner is a black bar containing links to map functions including Project Home, Grayscale Map, Quickzoom and Print. This bar also shows the current map scale, the current coordinates of the cursor in the map as the user moves the cursor and the map projection information.

Below the links bar is the map pane and the information pane. The map pane, which appears on the left, contains a toolbar in the upper-left corner with six icons (top to bottom): pan, zoom in, zoom out, get hyperlinks, identify and zoom to full extent.

The information pane on the right has two tabs along its top margin. The area below the tabs provides various types of information.

The page footer below the map and information panes contains a map use disclaimer and the department's contact information.

LINKS

Below the banner on the map page, users will find a black bar with several helpful links:
- Project Home

- Grayscale Map
- Quickzoom
- Print

PROJECT HOME

This link takes the user to the current theme's home page. For example, if the current theme is Hazardous Waste Sites, this link will take the user to the Missouri Department of Natural Resources Hazardous Waste Program. Each theme has its own home page with additional information about the theme's features and contact information.

GRAYSCALE MAP

This link enables users to choose color or grayscale maps. If the user is currently viewing a color map the link will say 'Grayscale Map,' indicating that clicking the link will convert subsequent maps to grayscale. Likewise, if the user is viewing a grayscale map the link will say 'Color Map,' indicating that clicking the link will convert subsequent maps to full-color maps.

QUICKZOOM

This feature opens a new window that allows the user to quickly zoom to a specific area of the state. When the new window opens, the user is offered a list of categories on the left side of the window:

- **County** –Missouri counties
- **City (Population > 1,000)** – cities in Missouri with populations greater than 1,000
- **State Park or Historic Site** – lands owned and managed by the Missouri Department of Natural Resources for the public
- **Conservation Lands** – lands owned and managed by the Missouri Department of Conservation for the public
- **1:24k Quadrangle** – boundaries of 1:24,000 scale United States Geological Survey quadrangle maps
- **Section, Township, Range (PLSS)** – public land survey system (zoom to a township and range combination or to a specific section)
- **Landgrant (PLSS)** – public land survey system (zoom to landgrant)
- **UTM (Universal Transverse Mercator) Zone 15 Easting/Northing** – zoom to a coordinate pair in Universal Transverse Mercator, Zone 15 North, North American Datum 1983 (NAD83) meters
- **Decimal Degrees Lat/Lon** – zoom to un-projected coordinate pair in decimal degrees, North American Datum 1983 (NAD83)
- **Degrees, Minutes, Seconds Lat/Lon** – zoom to un-projected coordinate pair in degrees, minutes, seconds, North American Datum 1983 (NAD83)
- **Missouri River Mile** – zoom to a mile marker along the Missouri river
- **Mississippi River Mile** – zoom to a mile marker along the Mississippi River
- **Interstate Highway Mile** – zoom to a mile marker along a interstate highway
- **Address Matching** – zoom to a physical address

- **Layer** – zoom to the full extent of a layer, or the minimum or maximum view scales
- **MoDNR Regions** – zoom to the extent of a Missouri Department of Natural Resources region
- **Solid Waste Districts** – zoom to the extent of a solid waste management district
- **Missouri House Districts** – zoom to the extent of a Missouri House of Representatives district
- **Missouri Senate Districts** – zoom to the extent of a Missouri Senate District
- **State** – zoom to the extent of the entire state
- **RETURN TO MAP** –return to the map without changing the map extent

As the user chooses a category, the content in the window will change to reflect that category. For most, the user is presented with a list of choices. For instance, when the user chooses county, the program provides a list of counties. Some require additional information.

For the section/township/range (PLSS) category, the user must enter one of the following:

- to zoom to an entire township/range, the section box must be empty and a township and range selected; or
- to zoom to a section, the section must be entered and a township and range must be chosen

For the land grant (PLSS) category, the user must enter a land grant number. If the land grant cannot be found, the user will be notified.

For the UTM (Universal Transverse Mercator), decimal degrees and degrees/minutes/seconds categories, the user must enter a coordinate pair using the appropriate category. In addition to the coordinate pair, the user must choose whether to zoom to a specific scale or to a radius around the point. For scale, the user must enter a scale denominator, such as 24000 to zoom to a scale of 1:24,000. For radius, the user must enter a distance from the point in meters.

For the Missouri and Mississippi river mile markers, the user must enter a mile marker (in miles) along the river. For interstate highways, the user must first choose an interstate highway in Missouri and then specify a mile marker along the highway. The user must choose whether to zoom to a scale or radius as described above.

For address matching, the user can zoom to a single street address or a street intersection. If the user chooses to zoom to a street intersection, the user must enter two streets (without address numbers) in the boxes labeled 'Street 1' and 'Street 2'. For either method, the user must also enter a city name and a zip code. Finally, the user must specify whether to zoom to a scale or to a radius.

For zoom to layer, the user must choose a layer in the map and then decide how far to zoom:

- Full Extent – zoom to the full extent of the layer
- Minimum View Scale – zoom to the closest distance at which the layer is visible due to view scale constraints
- Maximum View Scale – zoom to the farthest distance at which the layer is visible due to view scale constraints

PRINT

This link will take the user to a page that is more "printer friendly" than the interactive map page. The page will contain a title, map, legend, disclaimer, time stamp, and current scale. At the bottom is a link to return the user to the interactive map page.

TOOLS

In the upper-left corner of the map pane is a toolbar with six icons:

- Pan Tool
- Zoom In Tool
- Zoom Out Tool
- Get Hyperlinks Tool
- Identify Features Tool
- Zoom to Full Extent Button

Five of these icons are tools and one is a button. A tool requires interaction with the map; before the tool will execute its task, the user must click the mouse in the map area. A button executes its task immediately.

PAN

To pan the map, the user must move the cursor into the map area, then hold down the left cursor button and drag the map in the direction that the user wishes to pan. When the cursor is released the map will be re-drawn with the new boundaries.

ZOOM

Both of these tools work in a similar manner. The user must move the cursor into the map area and then either clicks once (click and release) with the left mouse button OR clicks-and-drags a rectangle. If the user clicks once (click and release), the map will be re-drawn with the center being the location where the mouse was clicked. If the user drags a rectangle, the map will zoom to the approximate extent of the rectangle.

If the zoom-in tool is selected, and the user clicks once, the map scale will be doubled which will appear to bring the map closer to the user, thereby showing a smaller area in more detail. If the zoom-out tool is selected, and the user clicks once, the map scale will be decreased by approximately half which will appear to take the map farther away
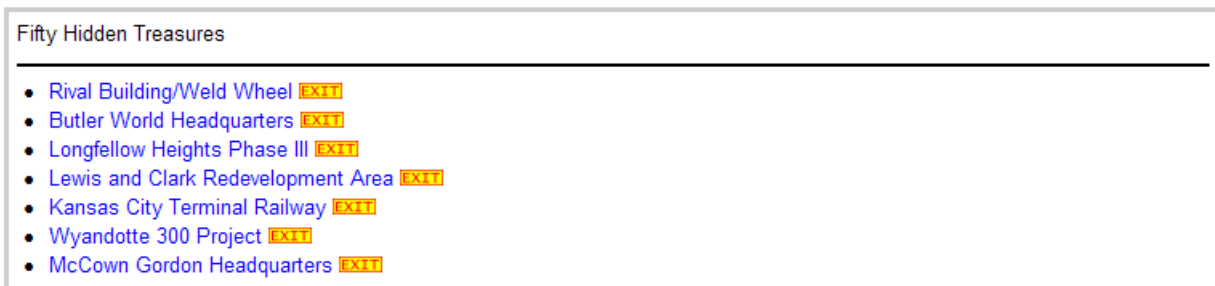
from the user, thereby showing a larger area. For example, if the map is being displayed at a scale of 1:24,000 and the user zooms in, the map will be displayed at a scale of approximately 1:12,000.

⚡ HYPERLINK

This tool is used to produce a list of hyperlinks. Each central theme contains one or more geographic features and each feature has a set of attributes. For example, if the central theme is 'Counties of Missouri', each county might have a set of attributes that corresponds to name, area, population, etc. One of the attributes could be a hyperlink. This tool reveals those hyperlinks to the user (Figure 2). These hyperlinks can be used to navigate to other pages that will provide additional information about any given feature. NOTE: Some layers, and some features within layers, may not contain hyperlinks.

To use the hyperlink tool the user must move the cursor into the map area and click once on a single feature or drag a rectangle around several features. Any hyperlinks that exist for the features they will appear in a new window (see image). Each hyperlink will be listed and will have an EXIT icon indicating that if the user clicks the link they will exit the application. The user can return to the map by pressing the 'Back' button on the browser.

Fifty Hidden Treasures

- Rival Building/Weld Wheel EXIT
- Butler World Headquarters EXIT
- Longfellow Heights Phase III EXIT
- Lewis and Clark Redevelopment Area EXIT
- Kansas City Terminal Railway EXIT
- Wyandotte 300 Project EXIT
- McCown Gordon Headquarters EXIT

Figure 2 – Show Hyperlinks Tool

ⓘ IDENTIFY

This tool allows users to view attributes about one or more features; each feature has a set of attributes associated with it. To view those attributes, the user must select this tool, then move the cursor into the map area and click on a feature or group of features or drag a rectangle around several features. If attributes are found for the feature(s), they will appear in a new window. The results will be presented as a list of links (Figure 3).

The following records were found for: Fifty Hidden Treasures (METADATA)
Isle of Capri Casino
Hotel Governor
Extended Stay America

Back to Map

Figure 3 - Identify Results

Each layer that can be identified will have a link to metadata for that layer labeled 'METADATA.' The metadata link will appear next to the layer name in the results window.

A list of features will appear along with each layer. Each entry in the list will also include a link to more information about that feature. Pressing a link will open the feature's attributes (Figure 4).

Identify Results Page > Fifty Hidden Treasures:Hotel Governor

The information listed below was found for this feature.

Layer	Fifty Hidden Treasures
Metadata	METADATA
Project Name	Hotel Governor
Status	Certificate of Completion Issued
Site Name	Hotel Governor

Figure 4 - Attributes for a Feature

Each attribute has a name and a value. The name describes what the attribute is, such as 'Project Name' or 'Status.' The attribute's value, such as 'Hotel Governor' or 'Certificate of Completion Issued,' appears next to it.

Some layers may have relationships to other layers or other data. If relationships are present, they will be shown below the feature attributes. Clicking on the green arrows will retrieve the rows in the related table. Figure 5 below shows attributes from 'Archaeology Sites:MO1179'. A relationship exists between 'ARCHSITE' and another dataset called 'SITEDATA.' Clicking on the green arrows retrieves the rows from 'SITEDATA' that are related to this row in 'ARCHSITE'.

Figure 5 - Feature Attributes

Figure 6 below shows the results of clicking on the relationship between 'ARCHSITE' and 'SITEDATA.' A related row is listed under 'SITEDATA'. The link in the 'Row Number' column is a link to its attributes. Clicking on the link '0' will show the attributes for the row in 'SITEDATA'. In turn, 'SITEDATA' may have relationships to other tables. If it does, they will appear similar to Figure 5.

Figure 6 - Related Features

An 'identify trail' appears along the top of the identify window and shows all the links that the user has clicked. Clicking on one of these 'identify trail' links will take the user back to that point. Clicking on 'Identify Results Page' will take the user all the way back to the original identify request.

Any link that begins with "REL:" is a result of clicking on a relationship between two data sets (i.e. the green arrows). In figure 6 above, the link 'REL:SITEDATA/ARCHSITE' was generated by clicking on the relationship between 'SITEDATA' and 'ARCHSITE'. The other link 'Archaeology Sites:MO1179' was generated by requesting the attributes of a specific site, and in this case, site 'MO1179'. Using the identify trail, the user can go back to any one of these steps at any time.

🌐 ZOOM TO FULL EXTENT

This is the only button in the toolbar. When the user presses this button, the map will be zoomed to the full extent of the State of Missouri.

USER INFORMATION PANE

The pane to the right of the map pane is the user information pane. There are two tabs across the top of the pane: 'Legend' and 'Table of Contents'. These tabs allow the user to switch between these panes at any time.

LEGEND

Pressing the legend tab will refresh the map window and show a graphic legend (figure 7). The legend shows each layer visible in the map and an example of the symbology for the layer. When the user is zooming in and out, various layers will appear and disappear as the scale changes. These changes will be reflected in the graphic legend. For example, as the user zooms in, river layers may appear in the map. The graphic legend will show the river layers once they appear in the map.
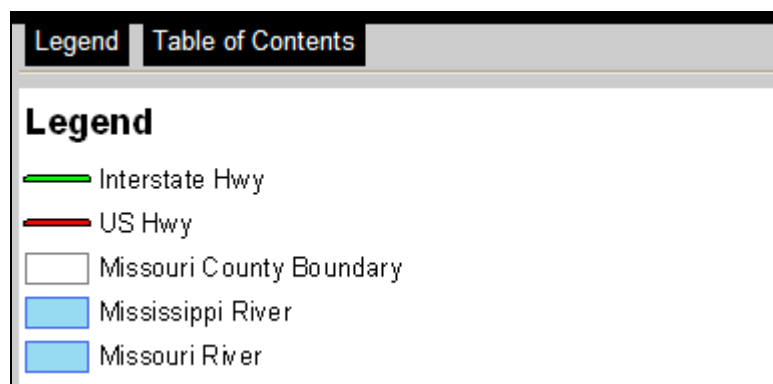
Figure 7 - Graphic Legend

TABLE OF CONTENTS

Pressing the 'Table of Contents' tab will show a table of contents (figure 8). A table of contents is a list of layers in the project, even if they are not currently visible in the map. A checkbox for each layer allows the user to show or hide the layer in the map. To hide a layer, uncheck the checkbox for the layer, then press the 'Refresh Map' button at the top of the table of contents to redraw the map. The main layer(s) for the theme will be highlighted yellow.

Figure 8 - Table of Contents

Some layers may be checked off by default. To view those layers, go to the table of contents and check the checkboxes, then refresh the map. These layers are provided to the user for additional information. To see all available layers for a map, go to the table of contents.

Even if a layer's checkbox is checked on, it may not appear at all scales. Each layer has two properties called the maximum and minimum view scale. For instance, if a layer has a minimum view scale of 1:24,000 and maximum view scale of 1:1000, it will only appear when the map is zoomed to a scale within that range. If the map is zoomed out beyond 1:24,000, the layer will not appear. Likewise, if the map is zoomed in beyond 1:1000, the layer also will not appear. This occurs even if the checkbox in the table of contents is checked. If the checkbox is checked off, the layer will never appear despite the maximum and minimum scale settings. If a layer is not visible due to its visible scale limitations, the layer name will appear in red text if zoomed in too close, or the layer name will appear in gray text if zoomed out too far.

Also included in the table of contents is a link to the metadata for each layer. Metadata describes the quality and age of the data, the attributes associated with the features in the map, and who to contact regarding questions about the data.

EDITOR OPERATION (Optional)

The editor is an option only available to editable themes. The editor allows editing of spatial and attribute data for pre-selected layers in the theme. Only vector data of type point, polyline or polygon can be edited. If the editor is available, it will appear as a third tab in the user information pane. Select this tab to access the editor.

Editing spatial data, or geographic features, operates based on sketches. A sketch is simply one or more points that may represent a point, polyline or polygon. The user can

create sketches by clicking in the map pane after the sketch tool has been activated. To create a point sketch, the user must double-click in the map at the location of the point. To create a polyline or polygon sketch, the user must click once to set an anchor point. Then, for each additional point in the sketch, the user must click once to add it to the sketch. On the last point of the sketch, the user must double-click to signal the application that the sketch has ended.

NOTE: You must not close polygons. They will be closed automatically by the application.

The editor pane resembles figure 9 below. At the top is a short set of instructions about creating sketches. The user may end a sketch operation at any time by pressing the 'ESCAPE' key on the keyboard, or by pressing the 'Clear Sketch' action. Actions are explained in more detail below.

REMINDER: For a point sketch, just double-click. For a polyline or polygon sketch, double-click on the LAST point only. For a polygon sketch, do NOT close the polygon by going back to the starting point. End the polygon on the NEXT to last point.

Below the instructions are two dropdown boxes: Layer and Sketch Action. Below these are a set of tool icons and a list of actions. The tools and actions are what allows the user to add and edit features and attributes.

LAYER SELECTOR

This is a dropdown box that selects the active editable layer. Not all layers in the map will be editable. Any tools or actions will operate on the layer chosen in this box. If the box contains more than one layer, the user should select the correct layer before executing tools or starting any action.
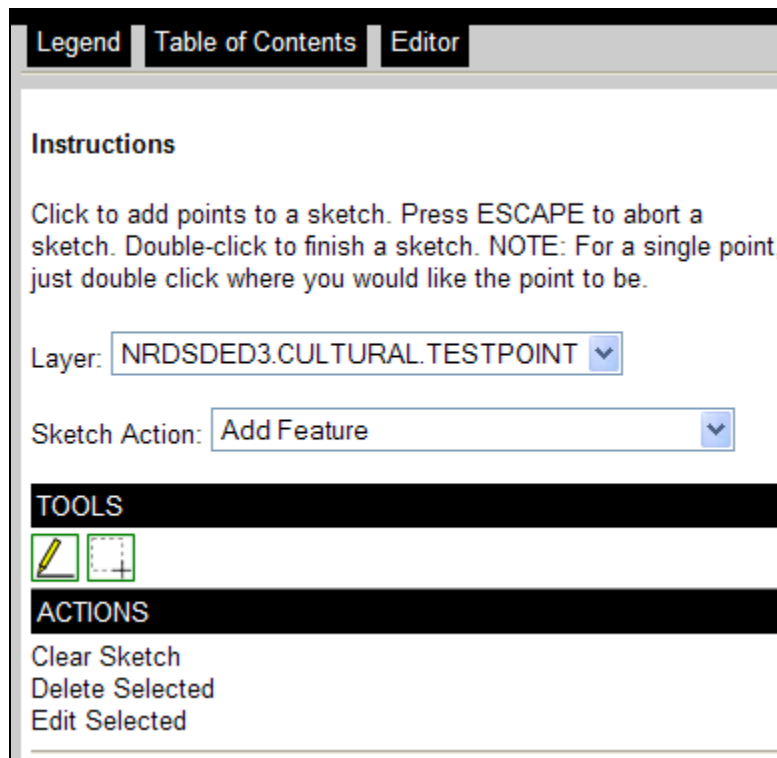
Figure 9 - Editor Pane

SKETCH ACTION SELECTOR

This allows the user to select a sketch action, which is the action that is executed upon completing a sketch. At this time there is only one sketch action: Add Feature.

ADD FEATURE

This action adds the sketch to the active layer as a new feature. If the active layer is a point layer, and the sketch contains more than one point, the first point in the sketch is used for the new feature. If the active layer is a polyline layer, the sketch must have at least two points before the feature will be added. If the sketch does not have at least two points, the user will be notified. If the active layer is a polygon layer, the sketch must have at least three points before the feature will be added. If the sketch does not have at least three points, the user will be notified. Once the sketch is complete, the feature will be added to the active layer and the map will be re-drawn. The new feature will then also be selected and will be highlighted in light blue.

TOOLS

The editor pane contains two tools: Begin Sketch and Select Features. Tools do not execute their actions until they are used in the map. When a tool is selected it will be highlighted in yellow, indicating that it is ready to be used in the map.

BEGIN SKETCH

The begin sketch tool begins a sketch session. A sketch session begins when the tool is selected and ends when either another tool is selected (such as pan, zoom or select features) or when a sketch is completed. The sketch session does NOT end when the sketch is cleared either by pressing 'ESCAPE' or by using the 'Clear Sketch' action. If the sketch tool icon is highlighted yellow, it indicates that a sketch session is in progress.

REMINDER: When the sketch session is ended by double-clicking in the map, the action selected in the 'Sketch Action' dropdown box will be executed.

SELECT FEATURES

This tool selects one or more features from the active layer. To use this tool the user may click once on a feature in the map or drag a rectangle over several features. If the user does not click on any feature from the active layer, the current selection will be cleared (i.e. nothing is selected). Selected features will be highlighted in light blue. Features will remain highlighted until the selection is cleared or until a new feature is added, whereby the new feature will become the only selected feature.

ACTIONS

The editor pane contains three actions: Clear Sketch, Delete Selected and Edit Selected. Actions are executed immediately after their icon is clicked.

CLEAR SKETCH

This action clears the current sketch. If the user has just begun a sketch, the user may click the 'Clear Sketch' action to clear any points or lines the user has added to the map with the sketch tool. This will reset the sketch session and allow the user to start over. NOTE: The user may also press the 'ESCAPE' button on the keyboard to execute the 'Clear Sketch' action.

DELETE SELECTED

This action deletes one selected feature from the active layer. If no features are selected, none are deleted.

CAUTION: Always check the active layer dropdown box before executing the Deleted Selected action to avoid deleting features unintentionally.

If more than one feature is selected, the application will notify the user to select only one feature.

NOTE: You may only delete ONE feature at a time.

After the action is executed, the selection for the layer will be cleared and the map will be re-drawn.

EDIT SELECTED

This action will open the attribute editor for the active layer. If one feature is selected, the user may edit the attributes for that feature. If more than one feature is selected, the user must choose one feature from those that are selected before the attribute editor will open. Attribute editor screens are custom built for each application (see CUSTOM FEATURES below). Once attributes are edited the user will generally have the option of saving the attributes or returning to the map without saving the changes.

CUSTOM FUNCTIONS

Custom functions can be added to the editor to edit the attributes for multiple tables or related tables. These functions will generally be added to the editor's attribute editing capability. Custom functions and tools can be added on a case-by-case basis.

MULTIPLE EDITORS

The editor is designed to allow multiple persons to edit the same data at the same time. Each person using the application will see changes immediately. This would be characterized as a 'single version' environment, where every editor is operating on the same data layer. This editor is not designed to handle a 'multiple version' environment. However, there are methods of tracking edits that can be implemented as the application is being designed.

APPENDIX I – ADDITIONAL INSTRUCTIONS

ARCHAEOLOGY VIEWER

The links bar has two additional functions: Search and Clear Selection.

SEARCH

The search function will allow the user to search for a site or survey by ID (identifier). For sites this is SITE_ID and for surveys this is SURVEY_ID. At the top of the page is a text box to enter the ID. Pressing the 'Search' button will begin the search. When it is complete the results will be listed below. Sites are listed first, then surveys. If no results are found the words 'No Results' will appear and no rows will be listed.

If there is a match the rows will be listed. *NOTE: Multiple polygons may be found for a specific ID.* For each row, the ID will be listed along with three options: Zoom To, Find Intersecting Sites/Surveys and View Report. The 'Zoom To' option will return the application to the map and zoom to the site or survey polygon, which will be highlighted in light-blue. The 'Find Intersecting Sites/Surveys' will take the polygon for the selected row and search for other site and/or survey polygons that intersect it. The new results will replace the old in the window. Finally, the 'View Report' option will create a PDF report in a new window for the selected row.

The user will also have a link to metadata for the site/survey data if rows are found.

CLEAR SELECTION

Once the user has zoomed to a site or survey from the search results window, the polygon will be highlighted in light blue. To clear the selection, the user must either search for and zoom to another site/survey, or press the 'Clear Selection' link.